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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/526,497	03/04/2005	Armin Kubelbeck	MERCK-2976	7347
23599 7590 06/27/2007 MILLEN, WHITE, ZELANO & BRANIGAN, P.C. 2200 CLARENDON BLVD. SUITE 1400 ARLINGTON, VA 22201			EXAMINER EMPIE, NATHAN H	
			ART UNIT 1709	PAPER NUMBER
			MAIL DATE 06/27/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/526,497

Applicant(s)

KUBELBECK ET AL.

Examiner

Nathan H. Empie

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 May 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 1-7 and 17-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>3/4/05</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Examiner acknowledges receipt of 5/29/07 preliminary amendment to the claims, which were entered into the file. Claims 8-16 are currently pending.

Election/Restrictions

1. Applicant's election with traverse of group II, drawn to claims 14-16 in the reply filed on 5/29/07 is acknowledged. The traversal is on the ground(s) that a) there does not exist an undue burden on the examiner; and b) that Miyashita (US 2001/0029156; hereafter '156) does not sufficiently teach the invention common to the groups. This is not found persuasive because:
 2. a) A serious burden exists in the differing issues likely to arise during the prosecution of the different inventions and species. Each invention has attained recognition in the art as a separate subject for inventive effort, and also a separate field of search. M.P.E.P. 808.02.
 3. b) The examiner recognizes that the applicant acknowledges that '156 discusses the viscosity. The examiner re-asserts that '156 teaches the invention common to restricted groups, that invention being: a thickened, alkaline liquid etching medium for the etching of silicon surfaces. '156 teaches "the polishing material as an alkaline solution" where "the alkaline solution may be a material for chemically etching silicon" [0074]. '156 additionally teaches "the polishing material into which an additive such as hydroxyethyl cellulose is added". Hydroxyethyl cellulose is a known thickener, therefor the addition of hydroxyethyl cellulose would thicken the alkaline solution.
 4. The requirement is still deemed proper and is therefore made FINAL.
 5. Claims 1-7, and 17-23 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected inventions / species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 5/29/07.

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Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 13 and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Szlufcik et al (US 2004/0063326; hereafter '326).

8. '326 teaches a method of etching photovoltaics, semiconductor technology, high performance electronics, photodiodes, circuits, or electronic components comprising applying an etching medium to the surface of said photovoltaic, semiconductor technology, high performance electronic, photodiode, circuit, or electronic component (abstract), wherein the etching medium is a thickened alkaline liquid (the etching paste is alkaline, [0023, 0037, 0039]) for etching a silicon surface or layer (the substrate is one of silicon, etc [0065]).

9. Claim 15: '326 teaches a method for etching (etching paste, 11) of silicon surfaces and layers for the production of a selective emitter (3) for solar cells ([0058]), Fig3 d-e); wherein the etching medium is a thickened alkaline liquid (the etching paste is alkaline, [0023, 0037, 0039]) for etching a silicon surface or layer (the substrate is one of silicon, etc [0065]).

10.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 8-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki (US 6,133,119; hereafter '119) in view of Ichinose et al. (US 5,688,366; hereafter '366).

13. '119 teaches a process for the etching of silicon surfaces and layers (col 11 lines 44-64), wherein the etching medium is an alkaline liquid (alkali, NaOH, col 11 lines 44-64) applied over the entire area or in accordance with the etch structure mask specifically only to the areas of the surface where etching is desired (etching process conducted on the face of the silicon substrate, col 11 lines 44-55) and is removed again after an exposure time of from 30 s to 5 min (the etching is conducted for 5 min, col 11 lines 55-64).

14. '119 does not teach a thickened etching medium. '366 teaches a chemical etching process with an alkali solution mixed with an additive to form a paste (col 3 lines 35-52). The motivation to thicken the etching medium taught by '119 is provided by '366 that teaches that etching with a paste "has excellent selectivity, and does little to no damage to the non-etching region" (col 1 lines 8-16), additionally, '366 teaches that applying the etchant as a paste is advantageous over conventional methods in that no pre-processes for forming a positive resist pattern, exposure, and development are required to apply an etched pattern to a surface; in addition, the post-process of resist removal is not needed (col 4 lines 7-30). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have thickened, as taught by '366, the etching medium taught by '119 to enable spatial etch selectivity that would eliminate processing steps.

15.

16. Claim 9: '119 teaches said etching medium acts at a temperature in the range from 70 to 150 °C and / or, if necessary is activated by the input of energy (the 2% NaOH solution is heated to 80 °C, col 11 lines 55-65).

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17. Claim 10: '119 teaches said etching medium is activated by exposure to heat (IR lamp, hotplate), (the 2% NaOH solution is heated to 80°, col 11, lines 55-65).

18. Claim 11: '119 teaches that a surface layer is etched by the alkali solution, but it is silent as to the means of applying the etchant. '366 teaches that the patterning and etching are performed at the same time by disposing an etchant on the surface to be etched (col 4 lines 7-30). The motivation to combine the method of application for the etchant as taught by '366 into a process for etching silicon surfaces is that '366 teaches that it is advantageous over conventional methods in that no pre-processes for forming a positive resist pattern, exposure, and development are required to apply an etched pattern to a surface; in addition, the post-process of resist removal is not needed (col 4 lines 7-30). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated the etchant application method as taught by '366 into the process of etching a surface as taught by '119 as it would eliminate processing steps.

19. Claim 12: '119 teaches said etching medium is rinsed off using a solvent mixture when the etching is complete (the etching is conducted for 5 min, and thereafter the silicon substrate (105) is immersed in a boiling water in order to instantly stop reaction and sufficiently clean with pure water, col 11 lines 55-61).

20. Claim 13: '119 teaches a method of etching photovoltaics, semiconductor technology, high performance electronics, photodiodes, circuits, or electronic components comprising applying an etching medium to the surface of said photovoltaic, semiconductor technology, high performance electronic, photodiode, circuit, or electronic component (the first embodiment of the invention exhibits a example of manufacturing a photoelectric conversion device, col 9 lines 14-19, col 11 lines 44-64). '119 in view of '366 teaches the etching medium is a thickened alkaline liquid (as described above).

21. Claim 14: '119 teaches a method for etching of silicon surfaces and layers for isolation of the pn transition in solar cells comprising applying an etching medium to the surface of said silicon or a layer for

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isolation of the pn transition in a solar cell (texture 106 to the uppermost portion of silicon substrate 105, Fig 2A, (col 11 lines 44-64); and it is preferable that a portion in the vicinity of the surface of the n-type conductive region 107 is etched and removed by sodium hydroxide (not shown), (col 12 lines 14 – 28).

‘119 in view of ‘366 teaches the etching medium is a thickened alkaline liquid (as described above).

22. Claim 15: ‘119 teaches a method for etching of silicon surfaces and layers for the production of a selective emitter for solar cells (texture 106 to the uppermost portion of silicon substrate 105, Fig 2A, (col 11 lines 44-64) provides the structure for the selective emitter, n-type region (107); and it is preferable that a portion in the vicinity of the surface of the n-type conductive region 107 is etched and removed by sodium hydroxide (not shown), (col 12 lines 14 – 28). ‘119 in view of ‘366 teaches the etching medium is a thickened alkaline liquid (as described above).

23. Claim 16: ‘119 teaches a method for etching of silicon surfaces and layers of solar cells for improving the antireflection behavior comprising applying an etching medium to the surface of said silicon or layer of a solar cell for improving the antireflection behavior (the textured surface (106) is formed by etching, whereupon a reflection preventing film (109) is formed (col 6 lines 56-60, col 12 lines 29-39)) where the resulting etched surface structure will influence the effectiveness of the antireflective film. ‘119 in view of ‘366 teaches the etching medium is a thickened alkaline liquid (as described above).

24.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure as they relate to etching processes with an alkali etchant: US2002/0079290 A1, US 6,391,145, US 5,704,992, and US 6,426,288 B1.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan H. Empie whose telephone number is (571) 270-1886. The examiner can normally be reached on M-F, 7:30- 5:00 EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571) 272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NHE



MICHAEL B. CLEVELAND
SUPERVISORY PATENT EXAMINER